Demand Access System

Operational Readiness Review (ORR)

13 May 2004

Operations Readiness Review Board

- **NASA:**
  - **Bryan Gioannini - Code 452, Chair**
  - **Beth Pumphrey - Code 586, Customer Representative/Swift**
  - **Leslie Ambrose - Code 451, Mission Commitment Manager**
- **NENS:**
  - **Steve Sypher - HTSI , Operations**
  - **Barry Lusby - HTSI, Maintenance**
  - **Jack Osborn - HTSI, Sustaining Engineering**

ORR Agenda

Purpose	**John Follin**
Documentation Readiness	**John Follin**
Engineering Readiness	**Jeff Scholtz**
Software/Firmware Readiness	**Jeff Scholtz**
Hardware Maintenance Readiness	**Zeke Walton**
Operational Readiness	**Manny Rios**
Overall Assessment	**John Follin**

ORR Agenda

- **Purpose**
- **Documentation Readiness**
- **Engineering Readiness**
- **Software/Firmware Readiness**
- **Hardware Maintenance Readiness**
- **Operational Readiness**
- **Security Assessment**
- **Overall Assessment**

ORR Purpose

- **Ensure a smooth transition from Development/Enhancement to WSC Operations**
- **Request concurrence from the Board on the following:**
  - ***Transition of the DAS to NENS for operational use and support, under direction of NASA.***

ORR Agenda

- Purpose
- Documentation Readiness
- Engineering Readiness
- Software/Firmware Readiness
- Hardware Maintenance Readiness
- Operational Readiness
- Overall Assessment

Documentation Readiness

- **Final Vendor Technical Data Package**
  - **Final version of all vendor documentation deliverables received**
  - **Several discrepancies resolved**
  - **Hard copies of some documents placed in the WSC Libraries**
  - **Soft copies of all documents placed on server accessible via WSC Admin LAN**

Documentation Readiness

- Operations and Maintenance Local Operating Procedures (LOPs)
  - 22 required procedures identified
  - 21 drafts complete and work orders submitted
    - Disaster Recovery for DASCON in work
  - 13 procedures published

ORR Agenda

- Purpose
- Documentation Readiness
- Engineering Readiness
- Software/Firmware Readiness
- Hardware Maintenance Readiness
- Operational Readiness
- Overall Assessment

Engineering Readiness

- **EC Status**
  - **Hardware installation compete**
  - **Implementation testing complete – Vendor Site Acceptance Testing**
  - **Documentation – All implementation related documentation work orders submitted**
- **Hardware Configuration Management**
  - **Complete DAS hardware inventory performed 3/04**
  - **Awaiting transfer documentation from NASA before tagging and entry into WSC Configured Articles List (CAL) database**

Engineering Readiness

Testbed Capabilities

- Nearly complete replica of WSC portion of DAS
  - No connection to GRGT
  - Single IBUG/2IBUs, 2 DMUs
- Complete set of interfaces to Legacy MAR,Ops and SMTF systems
- Ability to test system functionality with simulated or live TDRS signals
- Ability to test SWSI interface
- Ability to test interface with NISN
- Ability to test all DAS software, firmware and hardware
- Acts as a spare parts source
- Prime resource for hands-on training of operators and maintainers

Engineering Readiness

- **Testbed Limitations**
  - **Not a resource for performing customer interface testing.**
  - **All customer testing should be scheduled and performed on the DAS Operational System.**
  - **Can't Test TDRS East/West Transitions**
    - **Needs additional IBUG/ICON for a more robust test environment**
  - **No Link to GRGT**

Engineering Readiness

❑ Recent Testing

- Testing for Year-end rollover problem ETN successful
- Delivery FW0401 testing (April)
  - Covered DR specific testing
  - Also covered bulk of Extended Confidence Test
- Extensive customer compatibility testing with SWIFT
  - All runs successful

Engineering Readiness

Recent Testing (cont.)

- Extended Confidence Test
  - Sleeping DMU problem occurred pre-test
  - New DMU failover anomaly found and DR'ed during Loading Test
  - Rest of Tests successful
- SWIFT Emulation Testing
  - Pre delivery test had some potential problems but need analysis assistance from SWIFT MOC before we know conclusively
  - Post delivery test ok

Engineering Readiness

❑ Recent Testing (cont.)

- Engineering Tests at 1 Kbps frequency demonstrated out-of-spec acquisitions in Mode A as well as Mode B
- Orbit propagation study performed for balloon missions
  - Results turned over to GSFC for mission planning
  - Additional ETN and DR testing continuing

Engineering Readiness

- **DR Status**
  - **168 DRs open – Total as of 5/6/04**
  - **1 Priority 2 DR**
    - **46183 – Year End Roll-Over anomalies**
      - **Awaiting an integrated rollover test in the testbed before declaring complete success.**
  - **48 Priority 3 DRs**
  - **49 Priority 4 DRs**
  - **70 Priority 5 DRs**

Engineering Readiness

- **Issues**
  - **Out-of spec acquisition times possible for services operating at 1Kbps with frequency offsets - DR 46178**
    - **May affect early DAS users; SWIFT/GLAST**
    - **Details in backup slides**
    - **Recommended Task Order item**
    - ***Impact - Delay in acquisition of up to several seconds possible***
  - **Scheduling and Fault Management Algorithms**
    - **Lacking in robustness and maturity**
    - **May require significant rework to stabilize**
    - **DRs 46117, 46264, 46219, 46263, 46229, 46262, 46297, 46242 and others**
    - **Recommended Task Order item**
    - ***Impact - Improper rescheduling, loss of service***

Engineering Readiness

- Issues (Cont.)
  - DAS Orbit Propagator
    - Numerous ephemeris generation anomalies documented
      - Visibility discrepancies for high lattitude, stationary users (LDBP)
      - *Impact - Incorrect visibility windows -> loss of service time*
      - Frequent TDRS transitions with short events are problematic
      - DRs 46282, 46312, 46342, 46282 and others
      - *Impact - events are shorter than they should be*
    - DASCON Propagator code not maintainable
      - Source code does not generate delivered library
      - Unable to baseline without significant reverse engineering effort
      - May be easier to replace code
      - *Impact - Unable to make changes to existing code*

Engineering Readiness

Issues (Cont.)

- **Power Supply Problems**
  - Non-standard dimensions of Aegis supplies results in unreliable connection “last-to-mate” Enable pin (required for normal turn-on and hot-swap)
  - Non-standard current sharing scheme incompatible with chassis backplane wiring – likely suspect for history of hot swap problems and power supply failures
  - Voltage turn-on timing anomalies observed with EMC

Engineering Readiness

Issues (Cont.)

- Power Supply Problems (Cont.)
  - Most efficient resolution is replacement with supplies from another vendor
  - New supplies have been evaluated but a suitable replacement has not been found
  - Recommend continuation of search
  - Problems common to EMC, IBUG, DMG, FO Switch
  - Additional details available in backup charts.
  - Recommended Task Order item
  - *Impact - Hot-Swapping power supply modules can cause service failures*

Engineering Readiness

❑ Issues (Cont.)

– Grounding Problems

- Floating ground discovered in FO Switch
- Power and Chassis grounds “accidentally” tied together via coax shields or signal return wiring rather than intentional connection via dedicated wiring
- Affected chassis: EMC, IBUG, DMG, FOS
- Recommended Task Order item
- EC to be generated to detail the changes required.
- ***Impact - Potential safety hazard***

Engineering Readiness

Issues (Cont.)

- Other mechanical problems
  - Misalignment of air vents between EMC chassis and power supplies and inefficient heat sink design contribute to excessive operating temperatures
  - FOS fans provide insufficient airflow over power supplies
  - Recommend chassis modification to improve air flow and replacement of Aegis power supplies
  - EC to be generated to detail the changes required
  - Recommended Task Order item
  - *Impact - Potential for heat-related failures*

Engineering Readiness

- **Issues (Cont.)**
  - **Systran Network Transparent Switches**
    - **Used in EMCs, FO Switches**
    - **Appear to have a higher than expected failure rate, especially on unused ports**
    - **Large current draw (~20A/NTS Chassis), thus high heat generation**
    - **Removing unused cards in attempt to mitigate**

Engineering Readiness

Issues (Cont.)

- **Backplanes – EMC, IBUG, DMG, FOS**
  - Per power supply vendors, backplane capacitance inadequate for reliable hot-swap
  - Power output connections incorrectly installed resulting in damage to backplanes
  - Plan is to repair/replace damaged backplanes and add adequate capacitance to backplanes
  - EC to be generated to detail the changes required
  - Recommended Task Order item
  - *Impact - Unreliable Hot-Swap capability*

Engineering Readiness

- **Issues (Cont.)**
  - **Firmware baseline of VHDL code**
    - **Required for any modification to IBUG or DMG programmable logic**
    - **Source code and bit streams were delivered, but bit streams were generated with multiple tool versions that are currently unavailable**
    - **Baseline effort will require migration to higher tool version and functional testing**
    - **Recommended Task Order item**
    - ***Impact - Inability to modify IBUG or DMG programmable logic***

Engineering Readiness

Issues (Cont.)

- **Sleeping DMU problem - DR 46265**
  - DMU occasionally fails to respond to input commands
  - DMU occasionally fails to execute acknowledged commands
  - No failover initiated; causes loss of service for entire event
  - Occasionally requires power cycle of entire DMG to clear
  - Recommended Task Order item
  - *Impact - Loss of service with no operator awareness*
- **IBU – loss of single input fiber causes IF dropout and IBUG chassis fault**
  - disables all support for that TDRS
  - does not meet TGBFS design specification
  - Recommended Task Order item
  - *Impact - Loss of all services on a given TDRS*

Engineering Readiness

- **Desired Enhancements (Cont.)**
  - **Report generation and delog capability**
    - **No command delog DR 46130**
    - **Incomplete alert delog DR 46286, 46287**
    - **Inaccurate/incomplete report generation DR 46198**
    - **DASCON delog format; not “human-readable”**
    - **Minimal deloggable measureands DR 45275**
    - **Recommended Task Order item**
    - ***Impact - Inefficient system level fault isolation***

Engineering Readiness

- **Desired Enhancements (Cont.)**
  - **Non-coherent AGC**
    - **Successfully tested proof-of-concept design under TO 24**
    - **Need further funding to implement fully**
    - **Recommended Task Order item**
    - ***Impact - Degraded performance at low C/No***
  - **Coherent AGC design inadequate**
    - **Lacks feedback from symbol power estimation**
    - **Too slow to respond to some typical scenarios**
    - **Recommended Task Order item**
    - ***Impact- less than optimal acquisition performance***

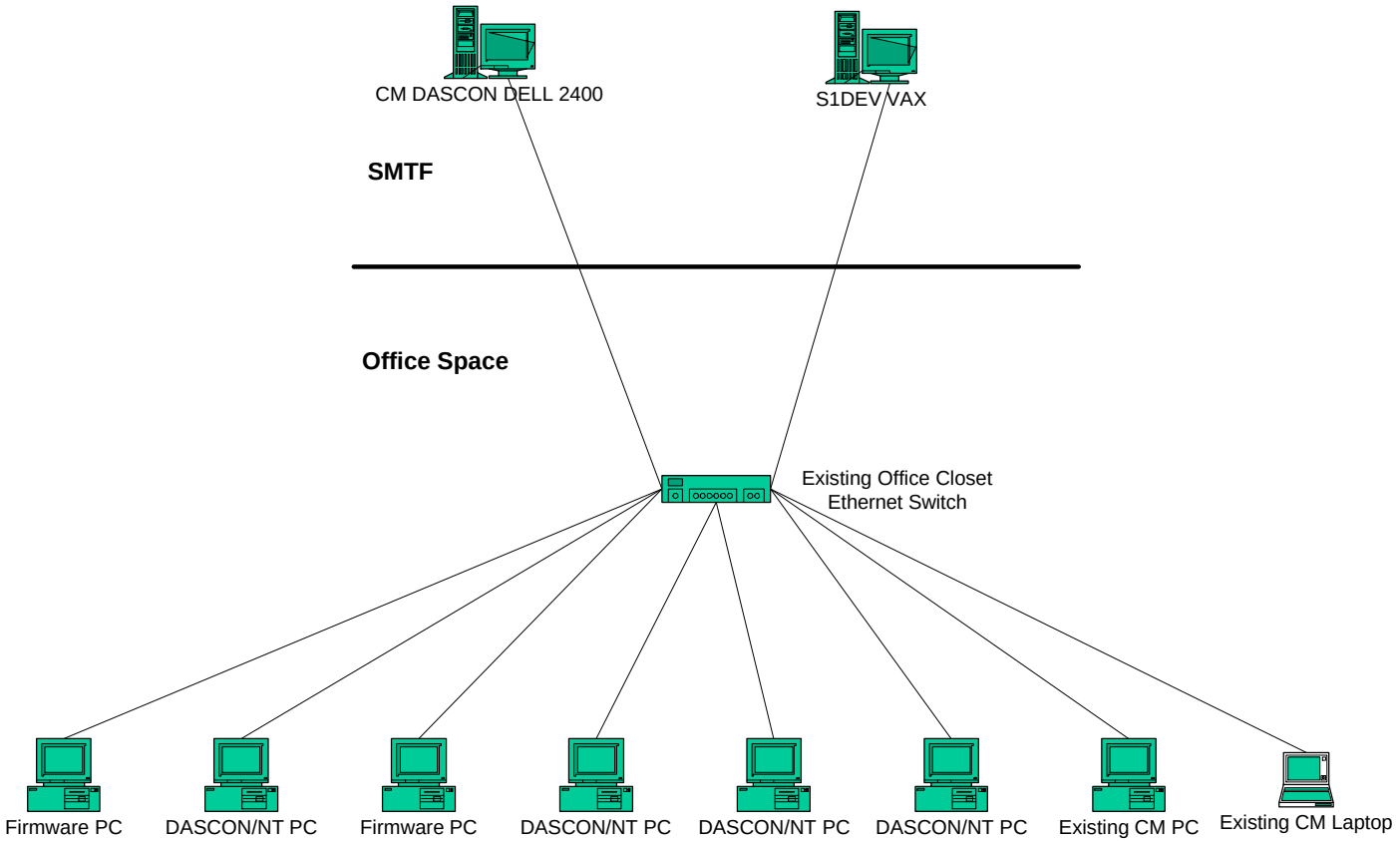
ORR Agenda

- Purpose
- Documentation Readiness
- Engineering Readiness
- Software/Firmware Readiness
- Hardware Maintenance Readiness
- Operational Readiness
- Overall Assessment

Build Environment Status

- Developer LAN implemented
- Some existing Xilinx licenses need to be migrated to new platforms
- Developer PCs and SMTF LAN printers need IP address configuration
- Oracle Licenses will be procured
- VisualCVS implementation will complete CM environment development

Build Environment Status (cont.)



WSC DAS Developer LAN

Software/firmware Documentation

- All Required Software/Firmware LOPs officially released by EOPS

Baselining Effort

- WSC has officially baselined all CSCs except Programmable Logic
- Decision to proceed with VHDL (IBUG and DMG) baselining effort has not been made

Tools/Licenses

- WSC is properly licensed for Visual Studio, Analog Devices, Vxworks and MS Access.
- Oracle Licenses will be procured
- Final Tornado license P.O. submitted
- CM and Development license copies for Xilinx and Altera devices purchased under TGBFS are suitable for use by DAS.

Security Assessment

- **Physical Security**
  - Systems installed in a Category II limited area
  - Building security includes continuous guard force monitoring, key card entry, and security camera monitoring.
- **IT Security**
  - IT Security Plan from development contractor (10/01)
  - Authorization To Process from Project Manager (5/03)
  - Coverage added to WSC IT Security Plan (02/04)

Security Assessment

- **IT Security - Open Items**
  - **Need risk acceptance memo from NASA covering the inability to pause workstations (Code 297 rqmt)**
  - **Need operational Authorization To Process letter covering DAS Op System and Test Bed**

ORR Agenda

- Purpose
- Documentation Readiness
- Engineering Readiness
- Software/Firmware Readiness
- Hardware Maintenance Readiness
- Operational Readiness
- Overall Assessment

Hardware Maintenance Readiness

- **Sparing – Level 1**
  - Sparing levels determined through a Sparing Conference held 8/1/01 and follow-on discussions. The list of spares were finalized and purchase orders generated on 5/10/02.
  - Some spares shipped to WSC in early 2003 for incorporation into the DAS Testbed.
  - Remaining spares delivered with the operational system.
  - HMD evaluated the need for additional spares.
    - MCP-750 Control Processors are used in EMC, DMG, IBUG, FO/SW. Current Sparing is 1. MSR submitted to increase sparing.
    - Testbed acts as “storage” for spare chassis and some cards.
    - Testbed is utilized heavily for software testing and training.
    - Software changes are tested in the testbed, as a result some spares may be out of CM baseline.

Hardware Maintenance Readiness

- **Sparing – Level 2**
  - **NENS will perform Level 2 maintenance on the following DAS LRUs:**
    - **IBUG - IBU**
    - **IBUG - FCRX**
    - **DMG - ACM**
    - **DMG - LPC**
    - **DMG – DPM**
    - **FO Switch – Blower Assy.**
  - **88 components were identified for stocking.**
  - **79 items are now in stock.**
  - **9 items are obsolete with no available source identified at this time. The search will continue.**

Hardware Maintenance Readiness

- **Training Assessment**
  - **WSC Training**
    - **A 2 Week Integrated TGBF Systems Course was developed.**
    - **Hands on time during training has been increased.**
    - **HMD provided 1 integrated course, 9/03, to 3 LMTs.**
    - **1 week refresher courses are scheduled for 6/7/04 and 7/26/04.**
    - **A 2 week integrated course is scheduled for 7/6-7/16/04.**
    - **HMD is developing a 2 day operations course for TOCC personnel (block diagram & dataflow).**
  - **Vendor Training (presented in 2003)**
    - **3 HMD Engineers and 6 LMTs attended Level 1 training.**
    - **2 HMD Engineers attended DAS O&M and DMG/FO Switch training.**
    - **Due to recent vacancies, additional vendor Level 2 H/W Maintenance Training for IBUG and DMG/FOSW is required.**

Hardware Maintenance Readiness

- **Maintenance Concept**
  - **Level 1 Maintenance**
    - **Maintenance is performed by on-shift technicians.**
    - **LOPs have been written for Chassis and LRUs that require unusual steps for replacements.**
    - **A Spare Parts Provisioning (SPP) list is under development by HMD with a target of completion by 6/1/04.**
      - **Lists all spare chassis and Level 1 LRUs.**
      - **Part numbers for each item.**
      - **Where each item can be found; Testbed, Logistics, etc.**

Hardware Maintenance Readiness

- **Maintenance Concept (Cont.)**
  - **Level 2 Maintenance.**
    - **Level 2 capability.**
      - **IBUG – IBU, FCRX**
      - **DMG – ACM, LPC, DPM**
      - **FO Switch – Blower Assy.**
    - **Maintenance is performed by the HMD.**
    - **Spares for approximately 90% of the semiconductor and other major components are on hand.**
    - **COTS LRU repair.**
      - **RTV where available – MCP-750 Processor**
      - **A lifetime supply of some spares were purchased.**

Hardware Maintenance Readiness

- **Tools**
  - **No special tools are required for Level 1 Maintenance.**
  - **HMD is capable of replacing high pin-density ICs and other Level-2 components.**
  - **Level 2 maintenance needs to be augmented by software modification of current code to provide capability to display, log and print Built-in Test (BIT) faults.**
    - **DR 45908 and 45909 will be modified to develop code for DMG and IBUG.**
    - **This concept eliminates the need to build special test fixtures.**

Hardware Maintenance Readiness

- **Issues**
  - **Many Level 1 spares used in the testbed.**
  - **Level 2 hardware maintenance training for IBUG, DMG and FOSW.**
  - **Obsolescence – several items have been identified that are no longer available.**
    - **ICON and DCON hot swap power supplies – looking at options for replacement.**
    - **AEGIS power supplies used in EMC, IBUG, DMG, FOSW.**
    - **Obsolete ICs discovered to date are shown on the following slide.**
  - **Residuals**
    - **A number of residual cards need to be tested prior to stocking in logistics.**

Hardware Maintenance Readiness

Part Number	Manufacturer	Description	Used on	Qty/Card	Source/Notes
Q1900C-1S3	Qualcomm	Viterbi Encoder/Decoder	DPM	1	Only available direct from Qualcomm, OBSOLETE-none left in stock, no replacement 858-651-4476 Diane | Summit Qualcomm will not make another production run None in DAS residuals
QS5993-7QI	Quality Semi	PLL Clock Driver	ACM	1	Unable to locate to date. Search for spares continues. 2ea QS5V933-2QC in DAS Residuals. Not replacements for QS5993-7QI
DS1804X-050	Dallas Semi	Trimmer Potentiometer; 50K range	ACM	1	Post DAS the design changed to use the -010 version with R111 changed from 174kohm to 34.8kohm - 1%. 41ea of DS1804Z-50 received in DAS residuals. X is Flip Chip package Z is 8L SIOC Package and is not a replacement for the X package. Continuing to search for spares.

ORR Agenda

- Purpose
- Documentation Readiness
- Engineering Readiness
- Software/Firmware Readiness
- Hardware Maintenance Readiness
- → Operational Readiness
- Overall Assessment

Operational Readiness

Operational Concerns

- Status to TOCC Operators is minimal
  - No Low Level DAS Status provided to TOCC Operators
    - No visibility during POCC unmanned operations
    - No WSC operator will be monitoring DAS operations
  - Single summary fault only
- No Operator Commandable Failover of DAS equipment
  - Requires pulling DMU/IBU card to initiate failover or delete and re-add of service
- Sleeping DMU may require power cycle of DMG
  - Impacts all on-going events
- Operations intervention is required to maintain logfiles
  - Requires manual deletion of logfiles
    - PM/AN implemented
  - System may crash if device is full

Operational Readiness

Operational Concerns (cont.)

- Reports and de-logging are not user friendly
- No WSC operator will be monitoring DAS
- No MI prediction (ACRS)
  - Require post mission analysis of user anomaly

Operational Readiness

- **Documentation**
  - **All documentation up to date**
- **Training**
  - **Based on Operation Concept there is no formal training required for TOCC personnel.**
    - **Two day high level course will be provided by HMD**
  - **Core cadre of LMTs trained**

Operational Readiness

❑ Open Alert Notices

Alert Notice	DR#	Problem Description
421	46219	DAS-IBU Reset does not consistently force IBU failover. Requires manual extraction of IBU to force a failover.
423	45472	DASCON playback search time range adjustment. Playback time in DASCON GUI must be adjusted to retrieve expected list of playback files.
427	46242	DASCON service failure cleanup procedure. Orphaned commands can lead to DMU fault.
431	46241	Delete orphaned telemetry files on PTPs.
432	45466	Event ID not generated when multiple events are entered at DASCON GUI.

ORR Agenda

- Purpose
- Transition Plan for DAS
- M&O Responsibilities – Post FOC
- Engineering Readiness
- Documentation Readiness
- Software/Firmware Readiness
- Hardware Maintenance Readiness
- Operational Readiness
- Overall Assessment

Overall Assessment

- **Operations is concerned about our ability to meet the high level of proficiency required under the NENS contract.**
  - **Without low level status, and with no operations personnel assigned to monitor DAS we cannot be proactive to mitigate data loss. Unmanned POCCs would be even more problematic.**

Overall Assessment

DAS is a complete paradigm shift for the Space Network and it offers new challenges to the M&O team

The NENS Contractor is ready to move forward with its integration into operations

Demand Access System

Operational Readiness Review (ORR) part 2

13 May 2004

NASA Document Status

Document	Doc Number	Status	Next Milestone
Operations Concept	453-OCD-DAS	Complete through DCN-02	Archive
Systems Requirements	453-SRD-DAS	Complete through DCN-01	Archive
DAS PVM	ITT No. 024-600007	Ready for Closeout (requires NASA signoff)	NASA Approval
DAS-WSC-ICD	453-ICD-DAS/WSC	Complete through DCN-01(saving changes for future DCN)	Maintain document
DAS-SWSI ICD	453-ICD-DAS/SWSI	Complete through Rev 1 (approved at Nov. 5, 03 CCB)	Maintain document
DAS-Customer ICD	453-ICD-DAS/Customer	Original complete (saving changes for future DCN)	Maintain document
DAS Lessons Learned	N/A	Original complete	Provide to NASA

As of 5/13/04

DAS Deviations and Waivers

- Deviations D01 through D15. (Deviation D03 never submitted and D05 not approved)
- Waivers W01 through W25 (Waiver W03 withdrawn)
  - Many Waiver SPRs were fixed post IOC.
- All DAS Deviations and Waivers are posted to the DAS Web Page. *http://stelwscpo.gsfc.nasa.gov/Das/default.htm*
- All DAS submitted Deviations and Waivers have been approved and signed by NASA.

PVM

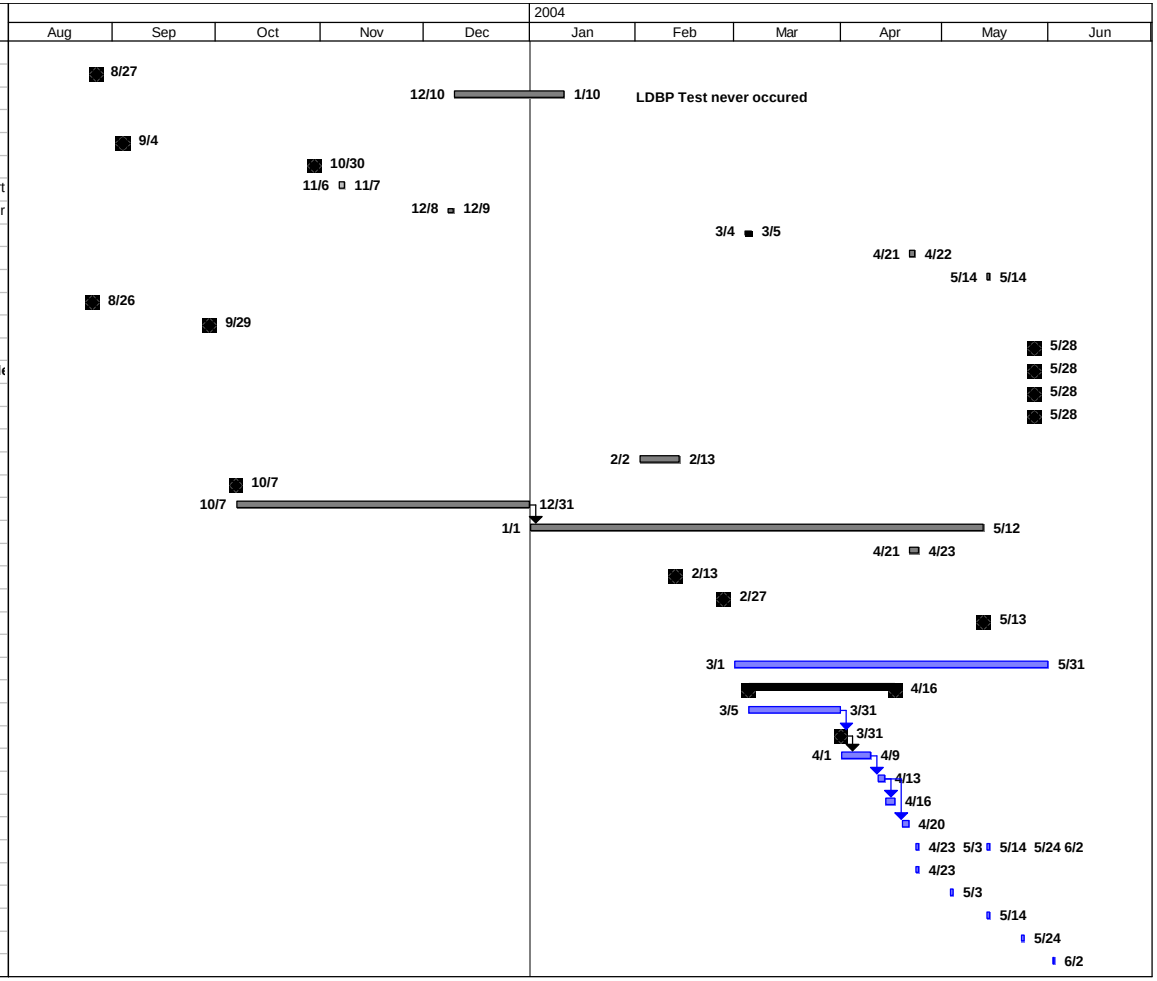
- 382 Total Requirements
  - 10 Requirements assigned to SWSI Product (Requirements: 3.1.6.g, 3.1.6.f, 3.1.2.3.2.a, 3.2.1.a, 3.2.1.1.a, 3.1.8.3.f, 3.1.8.3.b, 3.1.8.3.a, 3.1.1.a, 11.4.a)
  - 46 Requirements waived (Verification Status of "failed" and Requirement Status of "waived"). Many fixed post IOC.
  - 326 Requirements verified (Verification Status of "verified" and Requirement Status of "verified")
    - 8 Requirements deviated (Verification Status of "verified" and Requirement Status of "deviated")
- PVM Comment Field is well populated with pertinent information. Also provides information on associated waivers.
- Update of NASA Approval field from blank to "approved" remaining to be done

Web Page and Documentation Archive Plans

- The DAS Web Page will be "decommissioned" after DAS ORR
  - will no longer be updated accept upon specific request by NASA but will continue to be available for access indefinitely
  - Documents have been provided to CCMS
- All DAS data/documents will be archived for historical purposes:
  - A "DAS Web Page" CD will be generated that will contain all data/documents from the web page
  - A "DAS Documents" CD will be generated containing all significant DAS documents, meeting minutes, review slides, etc. This CD will contain NASA generated as well as ITT generated documentation
  - Some overlap of the above 2 items may exist
- The CCB'd documents such as the DAS SRD, OCD, WSC ICD, SWSI ICD, and Customer ICD are contained in the current CCMS online library (http://ccms.gsfc.nasa.gov)
  - CCMS needs to be updated to include latest versions

DAS Post-FOC Schedule
Customer Activity Schedule

ID	Task Name
1	**DAS Customer Pre Mission Testing**
2	LDBP Pre Mission Test (partial success on 8/27)
3	LDBP Pre Mission Test(LDBP 12/10/03 to 1/10/04)
4	LDBP Pre Mission Test (ULDBP 12/10/04 to 2/10/05)
5	Swift Pre Mission Test #2 with DAS Ops System & CTV Support
6	Swift Pre Mission Test #3 with DAS Ops System & CTV Support
7	Swift Pre Mission Test #3 RERUN with DAS Ops System & CTV Support
8	Swift Pre Mission Test #3 Rerun #2 with DAS Ops System & CTV Suppor
9	Swift Pre Mission Test #4 with DAS Ops System & CTV Support
10	Swift Pre Mission Test #5 with DAS Ops System & CTV Support
11	Swift Pre Mission Test #6 with DAS Ops System & CTV Support
12	**DAS Enhancement Build 2 Delivery Completed**
13	**DAS Enhancement Build 3 Delivery Completed**
14	**Implementation of Security Features on the HMD Test Bed (Complet)**
15	**Implementation of Security Features on the Operational System (Compl**
16	**Database Cleanup on HMD Test Bed (Complete)**
17	**Database Cleanup on Operational System (Complete)**
18	**Training Schedule**
19	DASCON/ECON/ICON Training (9-10 working days)
20	**FOC Review**
21	**FOC Liens/Critical SPRs Fixed Workoff (ITT under CSOC)**
22	**FOC Liens/Critical SPRs Fixed Workoff (HTSI under NENS)**
23	**DAS Confidence Test (Complete)**
24	**SWSI ORR**
25	**SWSI Cutover to Operational Server**
26	**DAS ORR**
27	
28	Other TO24 DAS Tasks
29	DAS Closeout Delivery
30	Programmer Build/Test
31	Cutoff for fixes
32	Build/Test
33	Deliver
34	Repeat pre-Closeout Test
35	CTV Functional test
36	DAS/Swift Proficiency Testing (Notional)
37	DAS/Swift Proficiency Testing (Notional) 1
38	DAS/Swift Proficiency Testing (Notional) 2
39	DAS/Swift Proficiency Testing (Notional) 3
40	DAS/Swift Proficiency Testing (Notional) 4
41	DAS/Swift Proficiency Testing (Notional) 5



DAS Customer Matrix (1 of 2)

Dated 4/28/04 (Ref R. Elwood)

Project	Swift	XSS-11	C/ NOFS	LDBP - 4ea	ULDBP - 1ea	AQUA
Launch Date	Tests Ongoing NET 7/15/2004	CTV Testing 6/21-25 NET 11/4/2004	CTV Testing 5/19-20 NET 12/2/2004	Tests in 5-6/04 12/10/04-01/10/05	Tests in 5-6/04 12/10/04-02/10/05	Discussing Using DAS Launched on 5/4/2002
Inclination/Altitude (Km)	22°/600	98.7°/850	13°/400-710	Antarctica/120K Feet	Antarctica/120K Feet	98.2°/705
PN Code	84	78	9	7,8,82,83,85	7,8,82,83,85	63
Antenna Type	Omni (2.2 dBW)	Omni (2 hemisphere)	Patch Ants (14.5 dBW)	Omni	Steer Dish-.46M	Omni
Srvc Type (# of TDRSs)	Any (3)	Specific (3)	All (3)	Spec (1 TDRS at time)	Spec (1 TDRS at time)	Any (3)
* Service Duration	24x7 (911)	TBD	24x7 (cont)	24x7 (cont ~60d)	24x7 (cont ~60d)	24x7 (911)
PTP HDR/FrmSync/VCP/RS PTP Frame Length (Bytes)	LEO-T/Y/Y/N 134	Async/na/na/na 1250(TBD)	LEO-T/No/na/na 1250	Async/Y/na/na 1264(TBD)	Async/Y/na/na 500	Async/na/na/na 256
Tx Modulation Scheme	SQPN-Single	BPSK	SQPN-Single	SQPN-Single	SQPN-Single	SQPN-Single
Data Rate - I Chnl Data Rate - Q Chnl	1,2,4 KB 1,2,4 KB	1.25, 5 KB 1.25, 5 KB	20 KB 20 KB	6 KB (1 LDB@150KB) 6 KB (1 LDB@150KB)	150 KB 150 KB	1 KB 1 KB
I/Q Power Ratio	1:1	1:1	1:1	1:1	1:1	1:1
Symbol Format - I Chnl Symbol Format - Q Chnl	NRZ NRZ	NRZ NRZ	NRZ NRZ	NRZ NRZ	NRZ NRZ	NRZ NRZ
Data Format - I Chnl Data Format - Q Chnl	M M	M M	M M	M M	M M	L L
Acq Mode (700 or 3000 Hz)	700	700	700	3000 ?	3000 ?	700

* 911= Occasional RF Transmission

* cont= Continuous RF Transmission

DAS Customer Matrix (2 of 2)

Dated 4/28/04 (Ref R. Elwood)

Project	AURA	TOPEX	TACSAT2 (Emg Tx)	GLAST	GPM-Core	GPM-Constellation
Launch Date	Discussing Using DAS NET 6/20/2004	Possible Support Launched on 8/10/92	6 Mon-1 Yr Support NET 2Q 2005 (Falcon)	NET 2/2007	IP in Space (SNIS) NET 6/2011	IP in Space (SNIS) NET 8/2012
Inclination/Altitude (Km)	98.2°/705	66°/1335	98.7°/350	28.5°/550	65°/400	98.2°/400
PN Code	73	37	TBD	36	32	
Antenna Type	Omni	HGA (24.6 dBW)	Omni	Omni (2.9 dBW)	Steer Dish-.76M	Steerable Dish(TBD)
Srvc Type (#of TDRSs)	Any (3)	Any (3)(TBD)	Specific (3)(TBD)	All (3)	Any (TBD) (3)	Any(TBD) (3)
Service Duration	24x7 (911)	24x7	TBD	24x7 (911)	24x7 (cont)	24x7 (cont)
PTP HDR/FrmSync/VCP/RS	Async/na/na/na	LEO-T/Y/Y/N(TBD)	LEO-T/Y/Y/N(TBD)	LEO-T/Y/Y/N(TBD)	TBD	TBD
PTP Frame Length (Bytes)	256	TBD	TBD	130		
Tx Modulation Scheme	SQPN-Single	SQPN-Dual	SQPN-Single	SQPN-Single	SQPN-Dual	SQPN-Dual(TBD)
Data Rate - I Chnl	1.024 KB	16 KB(TBD)	10 KB(TBD)	1,2,4 KB	100 KB	= 50 KB(TBD)
Data Rate - Q Chnl	1.024 KB	16 KB(TBD)	10 KB(TBD)	1,2,4 KB	100 KB	= 50 KB(TBD)
I/Q Power Ratio	1:1	1:4	1:1	1:1	1:1	1:1
Symbol Format - I Chnl	NRZ	NRZ	NRZ	NRZ	NRZ	NRZ
Symbol Format - Q Chnl	NRZ	NRZ	NRZ	NRZ	NRZ	NRZ
Data Format - I Chnl	L	M	M	M	L	L
Data Format - Q Chnl	L	M	M	M	L	L
Acq Mode (700 or 3000 Hz)	700	700	700(TBD)	700	3000(TBD)	3000(TBD)

* 911= Occasional RF Transmission

* cont= Continuous RF Transmission